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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,782	08/17/2001	Adrian S. Matthews	112914CIP	3755

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Samuel H. Dworetsky  
AT&T CORP.  
P.O. Box 4110  
Middletown, NJ 07748-4110

EXAMINER

VARTANIAN, HARRY

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/931,782	<b>Applicant(s)</b> MATTHEWS, ADRIAN S.	
	<b>Examiner</b> Harry Vartanian	<b>Art Unit</b> 2634	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 August 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12 and 15 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/2001</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 305, 306-2, 307, 308-2, 602, and 604. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. Document C1 of the IDS discloses Figure 2. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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***Claim Objections***

3. Claims 2 and 9-14 are objected to because of the following informalities:

In Claim 2, please define variables I and Q.

In Claims 9-11, and 16 applicant uses the phrase "a transmission channel" multiple times. The first instance is in the preamble of Claims 9 and 16. Is the applicant's intention to define multiple channels or one specific channel? Since the application shows the use of one channel divided into multiple sub-channels, it is recommended that a transmission channel is changed to "the transmission channel" in Claims 9-11.

In Claims 10-11 and 13, please define each and every variable in the equations.

Claims 12 and 14 are objected to for being dependent on an objected base Claim.

Appropriate correction is required.

4. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered Claims 13-16 been renumbered 12-15.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1-9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vahlin et al(SEE 892 reference U). Regarding Claim 1, Vahlin et al disclosed an OFDM/offset QAM system using optimal finite duration pulses, including prolate spheroidal pulses. Vahlin et al meet the following limitations of Claim 1:

receiving a channel output having a plurality of bits where each bit is sent in a particular dimension; mixing signals of the received channel output with trigonometric signals; **Fig 1 shows demodulation using a mixer having a sinusoidal input**

retrieving bits in each of the particular dimensions by: **fig 1**

reverse mapping the demodulated mixed signal to recover segmented bits; and reconstructing an originally transmitted bit pattern to recreate an original signal. **Fig 1**

Regarding the limitation "demodulating the mixed signals in an orthogonal filter bank of low pass Eigen filters defined by a transmitted prolate pulse of the channel output", Vahlin et al discloses the use of prolate pulses in the Abstract and on Pg 12, Para 5. Vahlin et al also describes the use of matched filters in Pg. 12, Para 1. Moreover, the filters shown in Figure 1 are orthogonal. He does not specifically describe the use of Eigen filters.

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However, the use of such filters is implied by Vahlin et al since he discloses the use of eigenfunctions(see last sentence on Pg 12, Column 1), a.k.a. prolate pulses. Therefor it would have been prima facie obvious to one of ordinary skill in the art to use eigen filters in system using eigenfunctions. A motivation to combine is stated by Vahlin et al wherein he states that the use of prolate wave functions reduces intersymbol interference(abstract).

Regarding Claim 2, Vahlin et al shows the parallel demodulation of I and Q components in figure 2 for subsequent reconstruction.

Regarding Claim 3, the rejection for Claim 1 above meets the limitations of the Claim. The reverse mapping circuitry is an inherent component in QAM demodulators.

Regarding Claim 4, the rejection for Claim 2 above meets the limitations of the Claim. The use of packet reconstruction circuitry is an inherent component in QAM demodulators.

Regarding Claim 5, the rejection for Claim 1 above meets the limitations of the Claim. The step of dividing a channel into a plurality of sub-channels is described on Pg. 10, Para 1. Summing and transmitting the modulated signal is shown in figure 1. Noise in a transmission channel is a well-known phenomenon.

Regarding Claim 6, the rejection for Claim 1 above meets the limitations of the Claim.

Regarding Claim 7, the reverse mapping step is inherent to QAM demodulation.

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Regarding Claim 8, 9, and 15 the rejections above meet the limitations of the Claim. In Claim 8, the limitation to "achieve high spectral efficiency by basing pulse shapes on a prolate pulse" is disclosed by Vahlin et al in the abstract.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vahlin et al(SEE 892 reference U) in view of Kerpez(US PAT# 5,295,159). Vahlin et al meets all the limitations of Claim 12(see above paragraphs) except disclosing the use of "water-filling" as described in the claim.

However, Kerpez discloses the use of water-filling in a multi-channel system that uses QAM{Abstract, (Column 1, Lines 31-47), (Column 2, lines 14-28), (Column 9, Lines 30-35)}. Therefor it would have been prima facie obvious to use water-filling in a QAM system. A motivation to combine is disclosed by Kerpez wherein he states:

"water-filling"...showed that significant performance gains can be achieved simply by allowing the average transmitted signal power on each channel to vary, while keeping the sum of the transmitted power on all the channels constant. (Column 2, lines 20-27)

#### ***Allowable Subject Matter***

7. Claim 10-11 and 13-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening Claims ***-AND- the objections stated above are overcome.***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian  
Examiner  
Art Unit 2634

HV



STEPHEN CHIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800